

CrackGAN: Pavement Crack Detection Using Partially Accurate Ground Truths Based on Generative Adversarial Learning

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Abstract

Fully convolutional network is a powerful tool for per-pixel semantic segmentation/detection. However, it is problematic when coping with crack detection using partially accurate ground truths (GTs): the network may easily converge to the status that treats all the pixels as background (BG) and still achieves a very good loss, named “All Black” phenomenon, due to the unavailability of accurate GTs and the data imbalance. To tackle this problem, we propose crack-patch-only (CPO) supervised generative adversarial learning for end-to-end training, which forces the network to always produce crack-GT images while reserves both crack and BG-image translation abilities by feeding a larger-size crack image into an asymmetric U-shape generator to overcome the “All Black” issue. The proposed approach is validated using four crack datasets; and achieves state-of-the-art performance comparing with that of the recently published works in efficiency and accuracy.